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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/431,076    11/01/99    FUJIWARA

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EXAMINER
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MM41/0913

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VII, H	PAPER NUMBER
ART UNIT	

2811  
DATE MAILED:

09/13/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

**Office Action Summary**

Application No.

09/431,076

Applicant(s)

FUJIWARA, ICHIRO

Examiner

Hung K. Vu

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 3, 5 and 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4, 6, 7 and 9-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election with traverse of Invention of Embodiment 1, Figures 3, 9, and 13, in Paper No. 9 is acknowledged. The traversal is on the ground(s) that the search and examination of the entire application could be made without serious burden. This is not found persuasive because even though 35 USC 121 authorizes restriction of two or more independent and distinct inventions, the term "and" has long been understood as "or". The law has long been established that dependent inventions (frequently termed related inventions) may be properly divided if they are in fact "distinct" inventions, even though dependent. The term "distinct" means that two or more subjects as disclosed are related, for example as combination and subcombination, process and apparatus for its practice, process and product made, etc., but are capable of separate manufacture, use or sale as claimed, and are patentable (novel and unobvious) over each other (though they may each be unpatentable because of the prior art.) It will be noted that in this definition the term "related" is used as an alternative for "dependent" in referring to subjects other than independent subjects. See MPEP 802.01. Furthermore every requirement to restrict has two aspects, (1) the reasons (as distinguished from the mere statement of conclusion) why the inventions as claimed are either independent or distinct, and (2) the reasons for insisting upon restriction therebetween. See MPEP 808. Where the related inventions as claimed are shown to be distinct under the criteria of MPEP 806.05 (c-l) the examiner, in order to establish reasons for insisting upon restriction, must show by appropriate explanation one of the following: (1) separate classification thereof, (2) a separate status in the art when they are classifiable together, or (3) a different field of search. See MPEP 808.02.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 3, 5, and 8 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected Invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 9.

### *Claim Objections*

3. Claim 9 is objected to because of the following informalities: In claim 9, line3, "contracted" should be changed to "contact" for clarity. Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In claim 4, the specification does not describe what "a PN type electroconductivity" is.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 2, 4, 6, 7, and 9-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, lines 27-37, it is unclear as to whether there is an another second gate insulating film, an another second gate electrode, and an another second charge storage means.

In claim 1, lines 33-34 and lines 35-36, "the gate insulating film" is unclear as to which gate insulating film is being referred to.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1, 2, 6, 7, 9-12 are rejected under 35 U.S.C. 102(a) as being anticipated by Yamauchi (PN 5,877,054).

Yamauchi discloses a nonvolatile semiconductor memory device comprising a plurality of memory elements formed in the vicinity of the surface of a substrate, a plurality of word lines for driving the memory elements, and a plurality of bit lines,

Each of the plurality of memory elements including:

A semiconductor channel forming region formed in the vicinity of the surface of the substrate (1),

A source region (2) in contact with the channel forming region in the vicinity of the surface of the substrate,

A drain region (2) in contact with the channel forming region at a position facing the source region in the vicinity of the surface of the substrate,

A gate insulating film (3) including a tunnel insulating film formed on the channel forming region,

A conductive gate electrode (5) formed on the gate insulating film,

A charge storing means which is provided in the tunnel insulating film and in the gate insulating film and is planarly dispersed to the other neighbor charge string means in the gate insulating film;

A gate electrode (7) of the plurality of memory elements being respectively connected to the plurality of word lines;

The gate insulating film formed on the semiconductor channel forming region and comprising a tunneling film contains material having a dielectric constant greater than that of silicon oxide. Note Figures 1-51 of Yamauchi.

With regard to claim 2, Yamauchi discloses wherein the tunneling film comprises any one of a nitride film, an oxynitride film, and aluminum oxide film, a tantalum pentaoxide film and BST ( $\text{BaSrTiO}_3$ ) film.

With regard to claim 6, Yamauchi discloses a pull-up electrode in the vicinity of the gate electrode or a wiring layer connected to the gate electrode, via a dielectric film;

A pull-up gate bias means for applying a voltage to the pull-up electrode.

With regard to claim 7, Yamauchi discloses wherein a plurality of gate electrodes of the plurality of memory transistors are connected to a plurality of word lines,

A selected transistor ( $Q_4, Q_5$ ) is connected between the pull-up gate bias means and the pull-up electrode, the pull-up gate bias means supplying a voltage having a polarity the same as to a polarity of boosting voltage for boosting the precharged word line by a capacitance coupling.

With regard to claim 9, Yamauchi discloses wherein each memory transistor comprises a source region contacted to the channel forming region, and a drain region spaced to the source region and contacted to the channel forming region,

Wherein a plurality of gate electrodes of the plurality of memory transistors are connected to a plurality of word lines,

Wherein the source region and drain region of each memory transistor are connected to a common line ( $SBL_1-SBL_5$ ) in a bit direction, electrically insulated to and intersecting the word line, and

Wherein the nonvolatile semiconductor memory device further comprises

A write inhibit voltage supply means for supplying a reverse-biased voltage to the source region and/or the drain region of the memory transistor the gate electrode of which is connected to the word line selected at a writing, through the common line, to make the source region and/or the drain region in a reverse-biased state to the channel forming region, and

A non-selected word line biasing means for supplying a voltage to a none-selected word line at the wiring, a polarity of the voltage being a polarity making the non-selected word line in a reverse biased state to the channel forming region.

With regard to claim 10, Yamauchi discloses wherein the write inhibit voltage supply means supplies the reverse bias voltage to the source region and/or the drain region to make a bias voltage of the memory transistor connected to the selected word line to thereby prevent an erroneous write and/or an erroneous erase.

With regard to claim 11, Yamauchi discloses wherein the non-selected word line biasing means supplies a voltage having a polarity for reverse-biasing to the none-selected word line to make a bias voltage of the memory transistor connected to the non-selected word line to thereby prevent an erroneous write and/or an erroneous erase.

With regard to claim 12, Yamauchi discloses wherein the non-selected word line biasing means a biases the gate electrode to the source region so that a voltage of the gate electrode becomes a low level equal or lower than an inhibit gate voltage.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person



having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamauchi (PN 5,877,054)

Yamauchi discloses all of the claimed limitations except the gate insulating comprising a PF type film including any one of a nitride film an oxynitride film, and aluminum oxide film, a tantalum pentaoxide film and a BST film. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the gate insulating film of Yamauchi comprising an additional PF type film including any one of a nitride film an oxynitride film, and aluminum oxide film, a tantalum pentaoxide film and a BST film in order to improve the hot carrier effect (HCE) between the gate electrode and the source and drain regions.

### *Conclusion*

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-5:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Application/Control Number: 09/431,076

Art Unit: 2811

Vu

September 10, 2001

Steven Loke  
Primary Examiner

A handwritten signature in cursive script that reads "Steven Loke". The signature is written in dark ink and is positioned below the printed name and title.